

operating points – one stable and one unstable – indicate that the process map is effective in predicting the stable and unstable behavior of multi-layer LMD fabrications.

Acknowledgements

This work was supported in part by the National Science Foundation (CMMI1301414) and through a US Department of Education GAANN Fellowship (P200A120062), with technical and experimental support from Optomec and MachMotion.

References

- [1] Doumanidis, C. and Kwak, Y-M., 2001, “Geometry Modeling and Control by Infrared and Laser Sensing in Thermal Manufacturing with Material Deposition,” *ASME Journal of Manufacturing Science and Engineering*, vol. 123, no. 1, pp. 45–52.
- [2] Pinkerton, A. and Li, L., 2004, “Modelling the Geometry of a Moving Laser Melt Pool and Deposition Track via Energy and Mass Balances,” *Journal of Physics D: Applied Physics*, vol. 37, no. 14, pp. 1885-1895.
- [3] Tang, L. and Landers, R.G., 2010, “Melt Pool Temperature Control for Laser Metal Deposition Processes, Part I: Online Temperature Control,” *ASME Journal of Manufacturing Science and Engineering*, vol. 132, no. 1, pp. 011010:1-9.
- [4] Sammons, P.M., Bristow, D.A., Landers, R.G., 2014, “Control-Oriented Modeling of Laser Metal Deposition as a Repetitive Process,” *American Control Conference*, Jun 4-6th, Portland, OR.
- [5] Rogers, E., Galkowski, K., Owens, D.H., *Control Systems Theory and Applications for Linear Repetitive Processes*, Berlin, Springer, 2007.
- [6] Sammons, P.M., Bristow, D.A., Landers, R.G., 2014, “Frequency Domain Identification of a Repetitive Process Control Oriented Model for Laser Metal Deposition Processes,” *International Symposium on Flexible Automation*, July 14-16th, Awaji Island, Hyogo, Japan.
- [7] “LENS MR-7 Systems – Optomec Additive Manufacturing,” *Optomec Additive Manufacturing*, Web, 10 July 2015.